NETWO WORLD

THE CONNECTED ENTERPRISE

JANUARY 14, 2013

OUTLOOK 2013

Our annual look ahead at the fast-evolving world of IT

Innovation trumps cost-cutting

5 technolgies to watch

IT resolutions

The increasingly secure cloud

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See page 2

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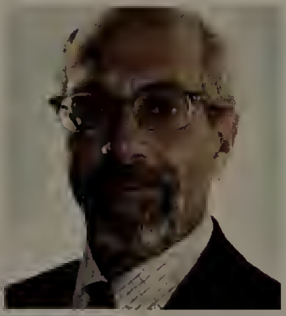
FROM THE EDITOR
JOHN DIX

Converging forces

Change is a given in this business, but 2013 promises to be particularly interesting because of the convergence of multiple, transformative developments, none of which are new, per se, given we have been tracking them in depth for some time, but each of which is forcing us to rethink long held conventions.

Cloud computing tops the list of course, giving us totally new ways to think about how to deliver IT services. At this point, every IT decision seems to include some consideration of cloud. And we're certainly still in the midst of the consumerization craze, trying to piggyback on worker enthusiasm for these mobile productivity tools while still safeguarding the company jewels. Lots of questions remain, but many opportunities stretch out before us.

Newer to the scene is software-defined networking, but SDN momentum going into this new year is huge and we are sure to see important advances. The big question for 2013 is whether the movement progresses as a whole, or is subverted by the established providers as they scramble to protect their installed base by offering SDN-like tools but without adhering to the emerging standards.



There are other promising new techs too (big data, for example), so strap in and hold on. IT in the new year promises to be one for the record books.

John A. Dix

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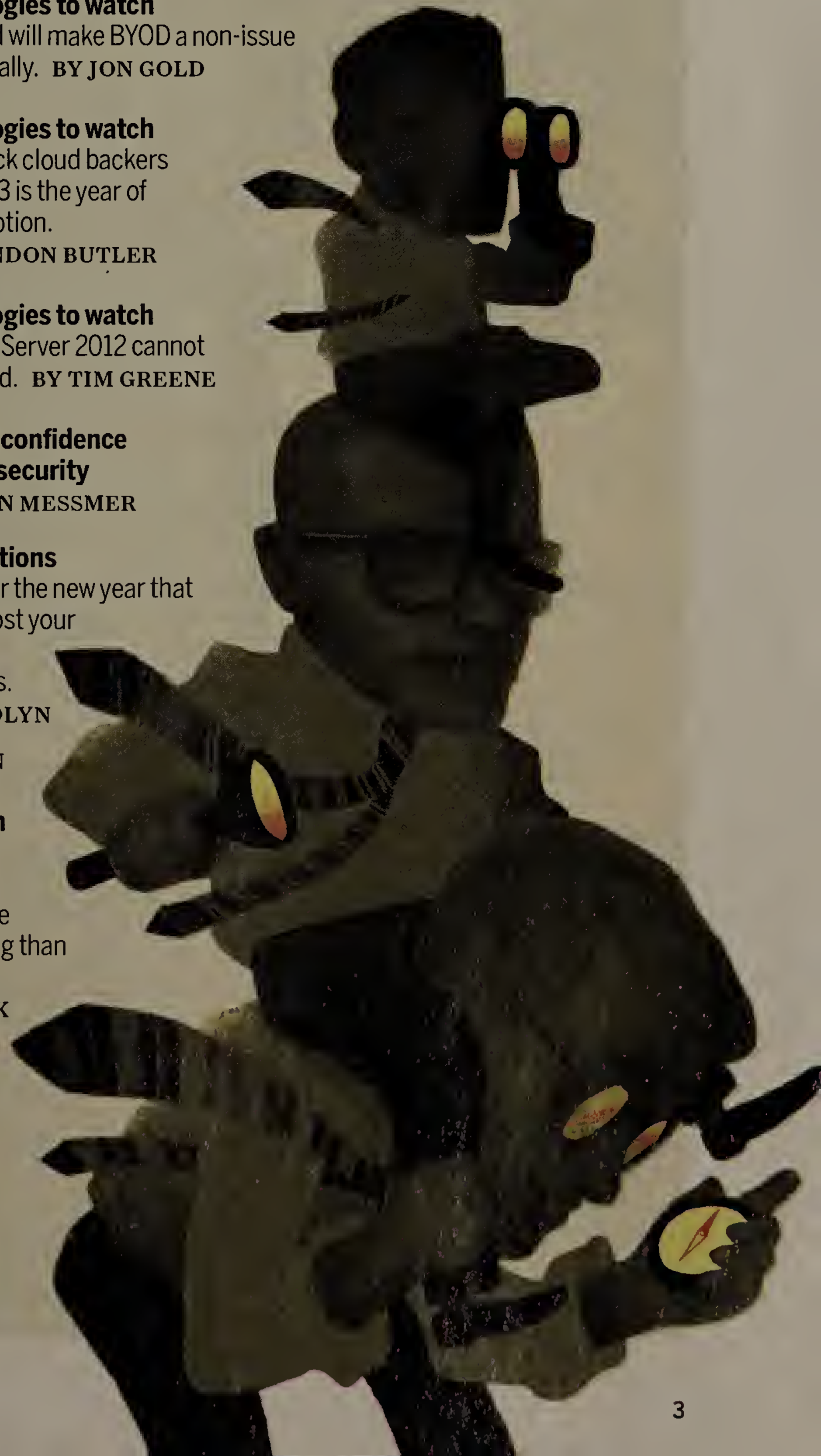

COVER/TOC ILLUSTRATION: SKIP STERLING

peersay

Weighing in on the year ahead

... Outlook for IT innovation

TOTALLY AGREE THAT IT is going through a period of transition that questions its ability to respond to business needs (Re: "2013 IT outlook: Innovation trumps cost-cutting"; page 12).

Improving the productivity of developers is not enough to respond on time to the business needs today. IT needs new software architectures that are more flexible (such as repository vs. code generation) and it needs to consider the cloud as its new development platform. It will take some time for the market to adjust but flexible tools and new solutions are on the way to help IT respond to changing business needs, to automate processes, to streamline organizational efficiency, to provide innovative services in a timely fashion, to manage the skills gap and to redefine their added value.

IT is the right place to navigate the needs for virtualization, Web-scale solutions, BYOD, cloud security, data integration, social media... but it will also have to work more closely with business to provide technical solutions that better respond to business problems.

Susan Haimet

... Maturity of SDNs

ALL OF THIS is being built on a creaky, antiquated IP layer from 1981, for which there are few remaining available addresses (none in Asia-Pacific or EU/Middle East) (Re: "Technologies to watch 2013: SDN matures, products flow"; page 19).

This is like horses with racing stripes and tail fins. But then again, most of your traffic is stolen MP3s and movies, or fascinating details about what the Kardashians had for breakfast.

Lawrence Hughes

> [Software-defined networking] is like **horses with racing stripes and tailfins.**

... Cloud and the BYOD trend

RESISTANCE IS FUTILE. The Apple iPad is a prime example of technology that was regarded as a consumer IT device that is now considered a corporate IT device (Re: "Technologies to watch 2013: The cloud will make BYOD a non-issue — eventually"; page 21).

Mr. Gold is right to assert that the "problem" of BYOD will not be solved by the usual means. MDM is a stop-gap measure and the cloud is where the solutions to BYOD will be implemented.

Tim Wessels

MDM IS A stop-gap but a cloud architecture is only as good as its network connectivity. Securing the user at the end node and not the device is critical in any cloud implementation. Offline use cases need to be factored into any cloud use case scenarios to be successful. Cloud is only one piece of a distributed computing architecture.

Don Duncan

... Windows Server 2012 adoption

WINDOWS SERVER 2012 can easily be ignored. Why does one need to pay money for a "license" to run software when you can run a Linux distro of choice? A Linux distro (CentOS) powers our entire infrastructure ("Re: "Technologies to watch 2013: Windows Server 2012 cannot be ignored"; page 23).

AD

... IT resolutions

I'M SURPRISED CLOUD computing is not more prominent in this list of resolutions. Cloud computing is far from a given in most IT organizations today (Re: "Best IT resolutions for 2013"; page 28).

This dominant trend is mentioned in "strengthen your IT bench," which is great advice as most IT organizations are lacking in cloud computing expertise. But it is not enough to simply charter IT to become proficient in cloud computing; IT and the CIO should take the lead and establish a business-focused cloud computing strategy for their enterprise — even if it is simply the business case for not deploying cloud-based applications.

If the business has not already deployed cloud apps (shadow IT), it soon will. If IT does not lead the effort, it will find itself following, or worse, failing to catch up.

Steve Romero

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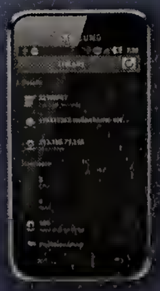

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bits

FCC pours more spectrum into Wi-Fi

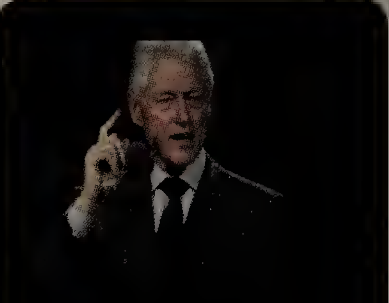
PLEAS FOR GREATER Wi-Fi support at airports and other public hubs haven't gone unheard, it seems. FCC Chairman Julius Genachowski announced at CES the agency plans to add 195MHz of spectrum for Wi-Fi — increasing the available capacity by 35% — to improve performance in crowded public places and in homes. The spectrum will be in the 5GHz band, and Wi-Fi users will share it with the U.S. Department of Defense and other government agencies. There are interference issues to be addressed, but it's important to move quickly, Genachowski said: "We're going to work out the problems as we go." *tinyurl.com/bgcwat5*

IBM cements 20 years of patent dominance

IT'S OFFICIAL: IBM has dominated the U.S. patent race for two decades. Big Blue earned 6,478 utility patents last year, topping the list of patent winners for the 20th year in a row, according to IFI CLAIMS Patent Services. Samsung was the second most prolific patent winner, with 5,081 patents. Microsoft took sixth place with 2,613, HP landed at 15th with 1,394, and Cisco slid to a rank of 31st with 951. Earning its first appearance among the top 50, Google increased its 2012 tally by 170% to 1,151 patents and landed at 21st in IFI's rankings. Right behind Google is Apple, which earned 1,136. *tinyurl.com/aygs47h*

Cyber money theft in decline

SCORE ONE for the good guys. U.S. banks and their customers are doing a better job of protecting themselves against cyberattacks that result in thieves taking over commercial accounts. In the first half of 2012, just 9% of cyberattacks resulted in funds leaving banks, according to a survey by the Financial Services-Information Sharing and Analysis Center. In 2011, 12% of account takeover attempts resulted in money leaving the banks, while in 2009, 70% of attacks involved money leaving the banks. *tinyurl.com/bxnewbo*



IT VIDEO

CES goes presidential

Former President Bill Clinton was on stage at CES 2013, but the main stars were the new gadgets and other technology on display. *tinyurl.com/a5t697h*

"Worst CEOs" list-maker unimpressed by hoodie, frat boy mentality

ZYNGA'S QUESTIONABLE $183 million acquisition of OMGPOP helped land Mark Pincus on Sydney Finkelstein's annual "Worst CEOs" list. Brian Dunn of Best Buy topped the list, which included five CEOs. Finkelstein, who teaches management at Dartmouth College's Tuck School of Business, bases his assessment on executives' corporate strategies and governance styles, among other issues. Mark Zuckerberg of Facebook and Andrew Mason of Groupon didn't make the top 5, but did earn dishonorable mentions — Zuckerberg in part for his "hoodie mentality," Finkelstein said. "There is nothing wrong with the 'hacker view' of being in love with your engineers and the creators of the technology, but when it comes to running a multibillion-dollar company, you have to behave a certain way," Finkelstein said. Mason's inclusion stemmed from a similar "frat boy" attitude as well as the firm's corporate strategy, Finkelstein said. *tinyurl.com/agmwrog*

Extreme Networks cuts workforce

EXTREME NETWORKS is laying off 13% of its workforce, or about 90 employees, in an effort to reduce expenses by $7 million per quarter. According to an 8-K filing with the SEC, the Ethernet switch maker implemented a cost reduction plan after downgrading results for its fiscal second quarter, which ended on Dec. 31. The plan calls for eliminating several management staff positions, consolidating operations in California and North Carolina to reduce real estate costs, and integrating data center and alliances sales teams under a single sales structure. Extreme has been struggling to grow, with market share of the $20 billion Ethernet switch market in 2010 and 2011 remaining flat at 1.3%, according to Dell'Oro. ***tinyurl.com/ako9esa***

Alcatel-Lucent funding SDN startup

LIKE CISCO and its Insieme Networks project, Alcatel-Lucent has invested in a startup company focused on SDNs for cloud service providers. Nuage Networks was established a year ago to tackle the scalability and automated service provisioning issues of cloud providers offering hybrid multi-tenant cloud services. The bottleneck for these operators, the company says, is usually the network, and that's what Nuage is focusing on. "We want to make sure the network gets out of the way," says Sunil Khandekar, Nuage CEO. Last April, Cisco confirmed its initial $100 million investment in Insieme, with the option to purchase the company for about $800 million. Neither Cisco nor Insieme has disclosed what the startup is working on, but it is believed to be a line of programmable 100G Ethernet switches and a controller, with substantial storage hooks. ***tinyurl.com/bkvclf5***

Epic archiving challenge

TALK ABOUT big data: The Library of Congress has received a 133TB file containing 170 billion tweets — every single post that's been shared on the social networking site — and now it has to figure out how to index it for researchers. In a report outlining the library's work on the project, officials note their frustration regarding available tools for managing such problems. "It is clear that technology to allow for scholarship access to large data sets is not nearly as advanced as the technology for creating and distributing that data," the library says. "Even the private sector has not yet implemented cost-effective commercial solutions because of the complexity and resource requirements of such a task." ***tinyurl.com/bbtngwp***

Windows 8 discounts set to expire

THE CLOCK is ticking on Microsoft's Windows 8 Pro upgrade discount, which will expire on Jan. 31 — at which point the company will triple or even quintuple the price of the new operating system, according to several online retailers. On Jan. 4, Microsoft reminded customers that a different upgrade deal will expire Jan. 31 — one that lets purchasers of new Windows 7 PCs acquire Windows 8 Pro for $14.99 — but made no mention of the same deadline for an upgrade from Windows XP, Vista and Windows 7 on older PCs. That discount, also set to end Jan. 31, prices a download upgrade to Windows 8 Pro at $39.99, or $69.99 for a DVD. According to online retailers, including Amazon, Newegg and TigerDirect, the DVD-based Windows 8 Pro upgrade carries a suggested list price of $199.99, or nearly triple the now-discounted price. ***tinyurl.com/a2u6ag9***

GOOD **BAD** **UGLY**

good

Verizon's dream: Super Bowl stream

VERIZON CEO Lowell McAdam told CES 2013 attendees — during an on-stage interview with NFL Commish Roger Goodell (above) — that the carrier hopes to stream the 2014 Super Bowl live over its nationwide LTE network. So those of you stuck working, at a wedding reception or the theater during next year's Super Bowl...there's hope that you can still catch the game live. "There's never been a better time to be a fan," Goodell said.

bad

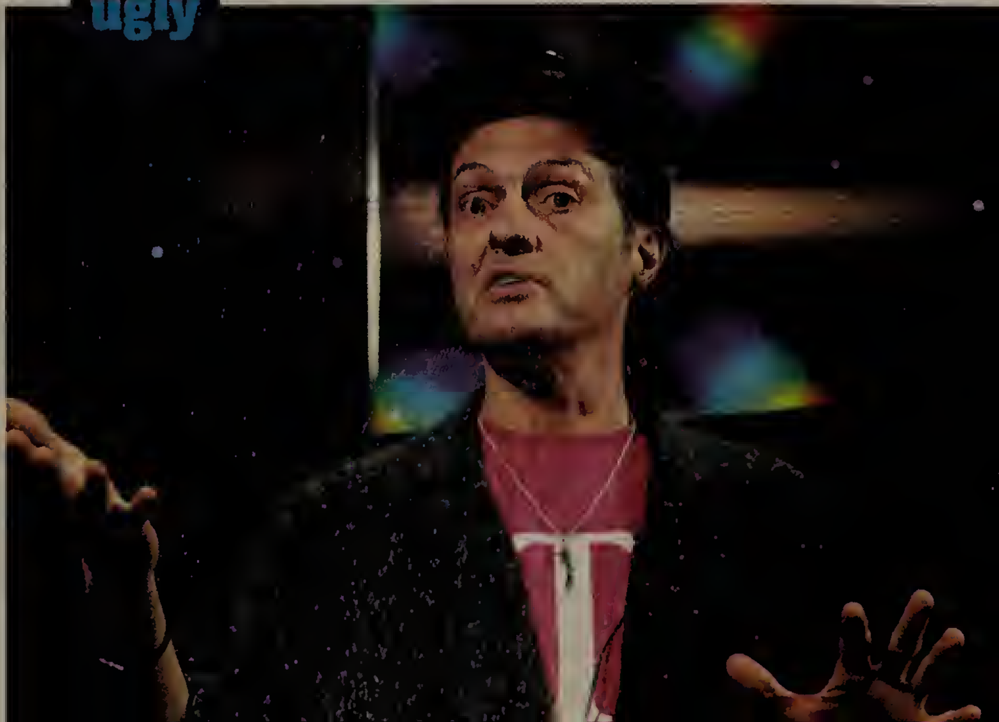
Thieving Apple fanboys show Microsoft ultimate disrespect

THIEVES BROKE into Microsoft's Mountain View campus last week, and stole five iPads, but left all Microsoft-branded products behind according to a police report. Mountain View is the location of Microsoft's primary research and design facility, so you would expect it to be awash with Windows products, such as the recently released Microsoft Surface tablet and Windows 8-based laptops. However, the canny thieves or thief decided to steal only Apple-branded products. The thieves probably assumed the Apple-branded products were worth much more on the black market. (via MacWorld U.K. and Palo Alto's Daily Post)

ugly

T-Mobile CEO doesn't pull punches

WHEN YOU'RE the No. 4 wireless carrier in the United States, you really do have to try harder, and that includes veering away from the usual corporate speak during your CES 2013 keynote address. T-Mobile CEO John Legere not only said AT&T's New York City network is "crap," but he said this of Verizon's strategy: "Shared data plans are a thing of the past. A 10-gigabyte, 5-device shared data plan, when Joe Schmoe Junior starts to watch porn on his phone, isn't going to work."



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VMWARE VSPHERE 5.1

VMware one-ups Microsoft

New vMotion capabilities make it easier to move virtual machines

BY TOM HENDERSON

CLEAR CHOICE TEST

The race for virtualization dominance between Microsoft and VMware has become more interesting with VMware's recent release of vSphere 5.1. We obtained vSphere around the same moment as the final release of Windows Server 2012, whose newly included virtual switch and enhanced Hyper-V features were designed to clobber VMware.

But back in the garages of its digital "brickyard," VMware was scheming to one-up the one-ups.

While we like Hyper-V 3, there are both pronounced and subtle reasons why we like vSphere 5.1 a little more. Some of the competitive difficulties amount to classic Microsoft problems revolving around support for competitive platforms. But VMware also does a better job trying to lift the barriers to virtualization via annual aggressive releases.

The trump card of this release is the ability to move a virtual machine from one machine and storage space to another. If your use of virtualization is small, this release won't make much difference to you. But if you need optimizations or have an appreciation for moving VMs around as though they were almost toys, vSphere 5.1 does it.

The vSphere 5.1 specs are statistically awesome and yet esoteric. At the upper end, vSphere is capable of controlling a 1TB VM, or symmetric multiprocessing (SMP) with up to 64 processors. We don't know of any commercial hardware that supports either of these.

The vSphere 5.1 pricing model was changed at VMworld to a more simplified model revolving around processors/cores, but it's still the priciest virtualization that we know of. It still has warts, but there has been much plastic surgery and lipstick applied, as well — the face of a new Web UI.

Included in the vSphere app kit is an updated Distributed Switch. The switch now supports more controls, including Network I/O Control (NetIOC) for admittance controls, IEEE 802.1p tagging for QoS/CoS flows, and enhanced vocabulary for Cisco and IBM virtual switches. There is increased monitoring capability for the switch, both in-band and out-of-band, and many of the changes reflect control capabilities that are suited toward 10 Gigabit Ethernet.

We set up a local and VPN-connected network running several hardware servers through a 10G Ethernet Extreme Networks Summit X650 (locally) and between our lab and network operations center connection. The reason? The vMotion software will jam an equal number of pre-bonded virtual and physical ports with a traveling virtual machine during VM movements. More ports, higher speed, means a faster movement from one metal server to the target host for a moving VM.

We started up configuration on a bare-metal HP DL560 Gen8 server. This server has plentiful, even spectacular, power and serious disk in a 2U frame, and uses what we believe to be pretty standard drivers. But VMware's vSphere 5.1 lacked drivers for it, so it hung with an indiscernible error message. We recognize that we received early, yet not beta, supposed-to-be-production code, so we contacted VMware, and within a few hours we had a custom-cut of 5.1. From there, everything moved splendidly.

Of the subtle upgrades, this edition is able to use more complex authorization and certificate trading schemes, and still has an ongoing affinity for authentication with Microsoft Active Directory. However, instead of the Windows-only client, we could now use browsers from Windows, Mac OS and Linux. The UI is understandable and makes comparatively good use of browser windowing areas.

Our older vSphere clients were immediately subject to a download of a new client type when we used them to access 5.1 turf, and managing a combination of 5.0 and 5.1 resources requires the 5.1 denominator of vSphere client — which looks superficially identical to the old one. When we started looking to resources and configuration, we rapidly found newer features.

NETRESULTS

Product	**VMware vSphere 5.1**
Price	Starts at $495 for minimal configurations
URL	www.vmware.com
Pros	Atomic migration of live VMs with fewer limitations; enhanced virtual switch
Cons	Still expensive; becoming vastly complex

We wanted to test moving a VM from one machine to another, Storage vMotion-style, whose target didn't share the same storage. This means that the instance has to move its IP information, its storage basis, its work, and even its CPU type on the fly.

We moved it, although it required some initial work. We're used to the minutiae of setting up a VMware network, and little of that has changed. We provision our networks through ISO images that we store on an NFS network. Using NFS is still not without its pain on VMware, as initial boots from ISO images into VMs — even when we've pre-built and pre-seeded images — require comparatively obscure setups.

The upshot is that if you pre-configure Linux and Windows Server VMs (we tested Windows 2008 R2 and Windows 2012 gold release), you can envelop them in what amounts to a virtual wrapper that isolates them (largely) from machine-specific settings. This means that ISOs can conceptually be "hatched" into instances that are "wrapped" with settings that allow them to be moved and manipulated more as true virtualized object instances than was possible before.

Hosts still need vMotion or Storage vMotion (the new secret sauce) to permit live migration across hardware. But VM instances become more atomic, keeping their functionality intact, and are nearly immune to their external hosting environment's characteristics or even geography. They live in isolation, doing their work, and while they aren't ignorant of their external settings, the settings are a convenience — they're plugged into sockets, very "The Matrix"-like.

Once we accessed a vSphere 5.1 host, our vSphere 5.0 client was updated automatically, and didn't give us much of a choice about the location of where the new vSphere client was going to reside, an installer inflexibility. Nonetheless, we installed the new client and obtained access immediately to our host VM platforms.

It's probably best at this point to install the vCenter Server Appliance (vCSA) locally to allow it to access resources remotely. Missing this step caused us delays.

Using vSphere 5.1 client, we wanted to deploy an OVF template that installs the VMware vCenter 5.1 Server Appliance. The

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[1] Based on IBM testing and documented in IBM System x® Virtualization Server Consolidation sizing methodology. IBM Flex System x240 supports 2.7X more Peak Utilization Virtual Machines (VMs) than previous generation BladeCenter® HS22V.

[2] Based on IDC white paper "The Economics of Virtualization: Moving Toward an Application-Based Cost Model," Michelle Bailey, November 2009, http://www.vmware.com/files/pdf/Virtualization-application-based-cost-model-WP-EN.pdf

Optional IBM Flex System storage node available fourth quarter 2012.

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server appliance also holds the optional Web UI, and is a management control center for vSphere 5.1 installations. The vCSA uses a template file (OVA and OVF files that describe the procedure), and two VMware Virtual Disks (VMDK) — four separate files in total.

The OVA/OVF template files execute and deploy from the client-local resources including http/https/ftp and local disks/shares. We used an NFS share controlled by our newly updated vSphere 5.1 client in the lab. The NFS files are about 70 miles away.

This was a mistake on our part, as the vSphere 5.1 client initially dragged the OVF, the OVA, and the two VMDK files associated with the vSphere Server Appliance out of our NOC cabinet servers, across the Internet to the lab, where it dutifully then sent them back across the Internet to the target ESXi 5 host that we'd just brought up. The vCenter 5.1 client warned us: 149 minutes remaining; in reality, it took longer, about three hours. Locally, it would have taken perhaps half an hour.

This misery is obviated if one installs the Server Appliance locally. Remote execution would have been more handy, but as the vCSA does this, it has to be installed first.

How we did it

We tested vSphere 5.1 on an existing network consisting of two sides, lab and NOC. The lab is joined to the NOC at nFrame in Carmel, Ind., by a Comcast Business Broadband link into a Gigabit Ethernet connection supplied by nFrame. At the NOC at nFrame are several HP, Dell and Lenovo hosts connected by an Extreme Networks 10G X650 crossbar L2/L3 switch.

We installed freshly or upgraded various hosts with vSphere, as well as client machines, then installed the vCenter Server Appliance as described, and subsequently used this installed appliance as our access method to the converted vSphere 5.1 hosts. We installed several trial VMs from scratch, and two (Windows 2008 R2 minimal configuration VMs) to be used in a trial of Storage vMotion between hosts, as described. We also noted features of the Web client, and overall changes between supported features between vSphere 5.0 and 5.1.

SCORECARD

Product	vSphere 5.1
Administration/ Management (25%)	4.5
Installation/ Compatibility (25%)	4
Security (25%)	4
Features/Performance (25%)	4.5
Total	**4.25**

SCORING KEY > 5: Exceptional, **4:** Very Good, **3:** Average, **2:** Below Average, **1:** Consistently Subpar

The vCSA features are updated from the 5.0 version and offer more configuration options, especially authentication and database options. We could use an internal database to keep track of settings and configurations, or use an external database (Oracle was recommended). MS SQL Server can't be used, and we wondered why an open source database product wasn't offered for embedded tracking. The appliance is based on SUSE Linux 11, and it uses 4GB of memory and 8GB of disk. A non-monstrous installation ought to be more easily tracked with an internal LAMP-ish database product.

The vCSA can stand alone, or be synced with others in "Linked Mode," which requires authentication through Active Directory, and allows inventory views in a single group. Linked Mode vCSAs can't have vMotion migrations, however, which frustrated us.

Moving needles between haystacks

In the old model, VMware's vMotion allowed moving VMs, hot/live, between hosts if the hosts shared the same storage. VMware's Storage vMotion removes the limitation of requiring the same storage — if other small constraints are respected, including the maximum number of concurrent vMotions of any type that can be handled. VMotions aren't encrypted, however, and so VMware recommends (and we agree) that Storage vMotions (and normal migrations) need to be in wire-secure environments.

The maximum number of concurrent migrations is often a function of network traffic capability. We could bond several 10GB ports together to maximize transfer and minimize downtime of hot/live VMs, but on a network with congestion, or networks using VLANs, things could slow as VMs are tossed around. There are also limitations imposed on data stores that can be manipulated — a function of the version of ESX or ESXi in play.

Using a Gigabit Ethernet network, Storage vMotion of a sample Windows 2008 R2 VM took 11 minutes with two bonded 10G Ethernet ports and a back-channel connection. Linking all three available ports actually slowed things down (16 minutes), as the back-channel seems to be necessary for traffic management during v-movements. But we had finally proven the concept. Numerous bonded 10G Ethernet ports would have likely shortened the process of live migration.

We moved a VM from the lab location through the Internet, to our cabinet at nFrame. Our local network connection is variably throttled by Comcast, and so we won't quote overall migration time. Let's just say it was a very long time. Nonetheless, it worked.

Storage vMotion removes one large VM movement problem by allowing, conditions permitting, VM movement and/or replication to "foreign" (if licensed) hosts. High availability within a data center is increased, as is the ability to optimize host CPU cycles by match-fitting VM workloads with host spare-cycles. The Distributed Switch appliance and 10G Ethernet ports can make all the difference. Slower links make Storage vMotion less practical. It's our belief that VMware will sell, by accident, more 10G Ethernet switches.

Increasing high availability through the use of rapid failover to an alternate cabinet, room or even cross-country site is a direct function of communications bandwidth and managerial strength in terms of concurrent migration operations capability. For now, even if all the hypervisor hosts are licensed and running the latest version of VMware with fully configured Storage vMotion, there are upper-end practical limits to how much and how frequently VMs can be moved/migrated. ■

Henderson is principal researcher for ExtremeLabs, of Bloomington, Ind. He can be reached at kitchen-sink@extremelabs.com.

➔ IT Roadmap Boston will be returning to the Hynes Convention Center on March 4. IT Roadmap is a regional one-day technology event that features a full-day conference program, and an exposition hall with leading technology providers. ***tinyurl.com/asfyb7b***

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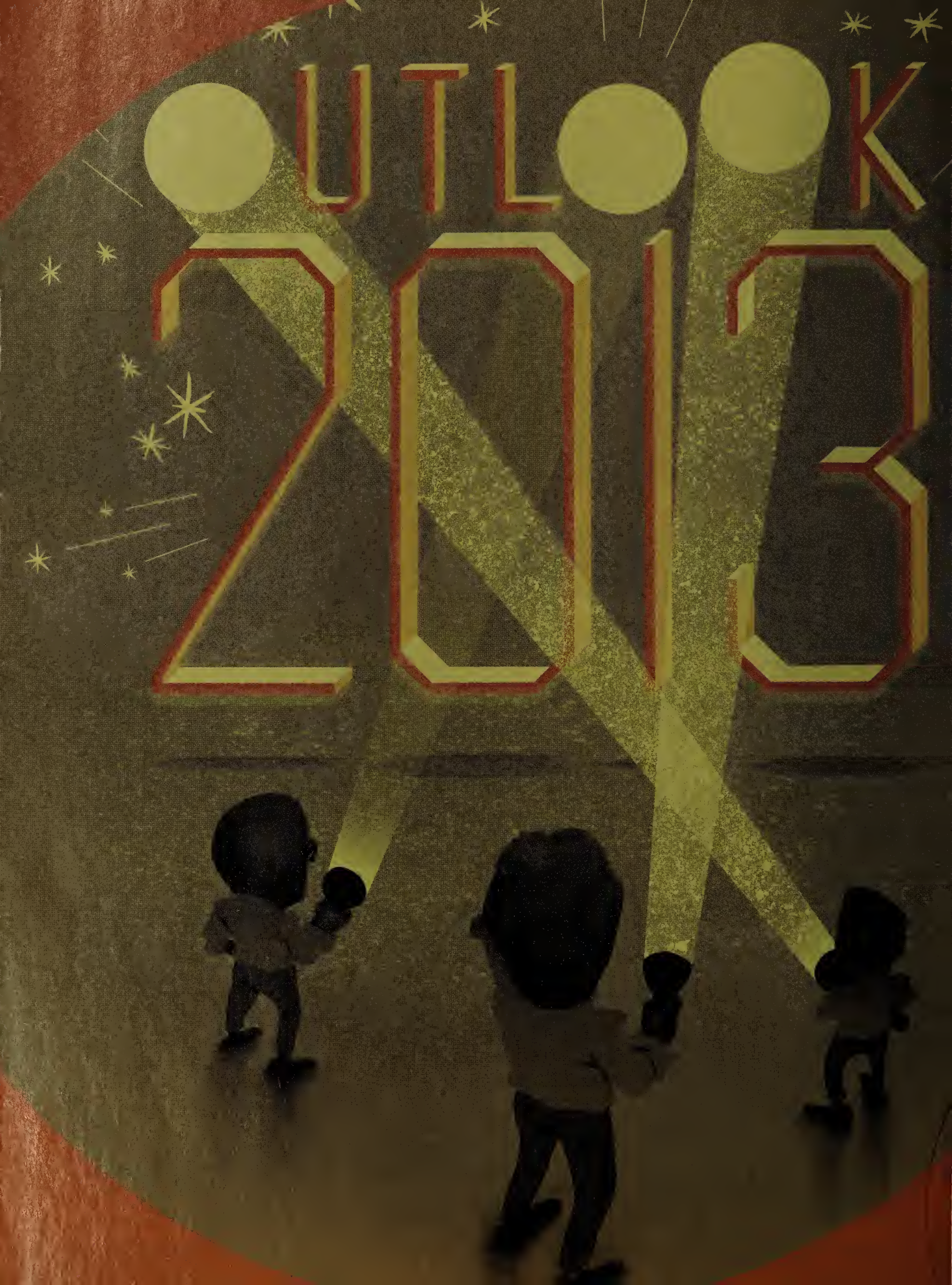
OUTLOOK
2013

INNOVATION TRUMPS COST-CUTTING

IT leaders have talked for years about the need to **better align IT** with the **business objectives**. Now there's a sense of urgency.

BY
ANN BEDNARZ

ILLUSTRATION
SKIP STERLING

THE ECONOMIC recovery is moving at an unsteady pace, but the emphasis on cost-cutting that dominated IT agendas in recent years is sharing the spotlight with a more interesting imperative: innovation.

"In spite of pressure to decrease costs companywide, we're significantly increasing our IT investment in 2013," says Michelle Kaufman, director of IT at Supplies Network, a St. Louis-based wholesaler of business supplies and services. "We're writing software to automate numerous processes throughout the company, which long-term will make us leaner and more efficient. We're investing in our managed print technology and in our B2B connectivity options, both of which drive revenue. We're investing in technology like VMware View and Microsoft Terminal Services [now called Remote Desktop Services] to enable a remote workforce to meet the needs of the business regardless of location. All of these have long-term payoffs."

Companies have always relied on IT to increase efficiencies, and for years IT leaders have talked about better aligning IT with business objectives to spur innovation. What's different today is the sense of urgency.

The global financial crisis, which knocked the stuffing out of IT spending, created pent-up demand for technology, and companies are still in catch-up mode. At the same time, the mainstreaming of new technologies, specifically cloud computing, is putting pressure on organizations to rethink their approach to IT.

"Cloud computing has accelerated the pace of change, undeniably," says Andi Mann, vice president of strategic solutions at CA Technologies. With the availability of cloud services, startups in industries such as retail, healthcare and media, for instance, can set up shop without making enormous capital investments in tech. "We've seen new competitors come into crowded markets and totally disrupt those markets, and they can do it on a dime because they don't have to buy infrastructure or set up a data center."

But it isn't just cloud computing. Other disruptive technologies at work include mobile computing, social media and tools such as virtualization that make IT more agile.

"These are changing the way that businesses are delivering new products and services to their customers," Mann says. "They can do it faster because of agile computing. They can do it at scale because of cloud. They can reach a richer, wider audience with social media. They can deliver products and services in entirely new ways, to entirely new audiences, using mobile."

IDC says worldwide IT spending in 2013 will exceed $2.1 trillion, up 5.7% from 2012. The biggest driver of that growth will be sales of smart mobile devices, including smartphones and tablets, which will grow by almost 20% in 2013. IDC is also forecasting healthy growth in global software and services spending.

As cloud, mobility and virtualization deployments continue, there's an opportunity for IT to play a more active role in driving new business growth. It's a daunting transformation for IT, and it won't happen overnight.

Efficient or innovative?

While driving revenue was an early goal of IT, over time the job shifted to modernization as information technology seeped into virtually every business activity, leaving precious few cycles for anything else.

"Most businesses today primary rely on IT to increase their organizational efficiency," says Bask Iyer, CIO at Juniper Networks. That's an improvement from, say, 10 years ago, when IT was seen primarily as a money pit. However, "IT is largely falling short of expectations to drive growth in new areas," he says.

Juniper sponsored a study conducted by the Economist Intelligence Unit that asked 474 IT and business executives from the U.S., Germany, Japan and the U.K. about how the role of IT is changing. When survey respondents were asked to describe the primary job of IT, their top three answers were telling: to improve efficiency in business processes (cited by 52%); to fix hardware and software issues (32%); and to improve security to mitigate potential IT-related threats (25%).

Very few businesses said they're successfully collaborating with IT on strategic initiatives such as identifying new market opportunities (9%), identifying new innovations (6%) and developing a competitive strategy (5%).

To change that, IT practitioners need to come out from behind the scenes, get to know the line-of-business executives and end users and become more collaborative, Iyer says.

Preconceptions will have to be overturned. Business executives have given IT low marks when it comes to enabling and supporting innovation, Mann says. Many don't think IT has the right skills, and tech folks don't have a reputation for being receptive to new ideas from the business.

Making changes "starts with convincing your peers that you can help drive innovation, that you're more than just a service department, more than just a butler to the business groups," Mann says.

It's important for IT to demonstrate a willingness to consider cloud computing, for instance, for its speed and agility — even if it means giving up control. "Show them you're ready to adopt mobile technologies, and support BYOD [bring-your-own-device]. Stop saying no to all these things," Mann says.

If you don't, business executives will take matters into their own hands. In some cases they already have, by buying their own mobile devices and inking contracts for cloud services without going through IT.

This concept of rogue IT shows up more in headlines than in reality, but the threat should still serve as a wake-up call. "You can get in front of it, find the best options and present those to your business peers," Mann says. That won't eliminate the threat, but mapping out how IT can be "better, safer, cheaper and easier to manage" than alternatives will reduce the desire to seek options.

Business collaboration is imperative. Kaufman of Supplies Network says "we avoid silos in decision-making, so business executives aren't off making technical decisions on their own. It's a key aspect of my role to understand their needs and to provide them with the right IT solution whether it's in the public or private cloud."

Likewise, Christus Health has processes in place to deal with the pull of rogue IT projects, says CIO George Conklin.

JUST ABOUT EVERY BUSINESS TODAY DEPENDS GREATLY ON TECHNOLOGY, **AND IF A COMPANY ISN'T GETTING THE MOST OUT OF TECHNOLOGY, IT WON'T SUCCEED.**

"We have organizational commitment to governance over IT that reduces the probability that someone will go off on their own without engaging my folks to ensure we are doing the right things," Conklin says. "We have done a lot to educate people and have a governance structure in place that ensures [any SaaS or cloud services] are thoroughly vetted and part of the plan," Conklin says.

Kevin Christ, senior director of Alvarez & Marsal Business Consulting, suggests it's a better use of IT's time and energy to guide business users who want a say in IT than it is to try to stop them from being involved in purchasing decisions. With BYOD, for example, most CIOs have thrown in the towel and moved on to focus on managing the attendant security, performance and access considerations, he notes.

"Increased business involvement is a positive trend as long as it does not lead to complete exclusion of the IT function," Christ says. "IT shops that are seen as value-added are rarely left out of the decision. The IT shop that is viewed as enabling is usually consulted, while the IT shop that is an inhibitor often faces the end run."

Finding the talent

One of the biggest barriers to IT innovation is talent. On the bright side, the jobs picture is healthy.

Seventeen percent of CIOs said they plan to expand their IT departments in the first quarter of 2013, which is nearly double the number (9%) who were planning increases in the fourth quarter of 2012, reports Robert Half Technology.

Companies have resumed hiring and expanding their workforces as the economy has shown signs of improving, but the mood remains one of cautious optimism, says Jack Cullen, president of IT staffing specialist Modis.

The biggest issue is how the tax burden for companies might change this year. But that uncertainty, while a concern, so far isn't halting hiring. "Companies need to continue to

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hire. There's still a backlog," Cullen says.

Finding the talent remains a challenge, however. More than half (63%) of the CIOs polled by Robert Half said it's tough to find skilled professionals today. The skill sets in greatest demand are: database management, cited by 48% of CIOs; network administration (47%); and Web development/website design (33%).

"Hiring has been a challenge [in 2012], especially in virtualization, SAN and programming," says Kaufman of Supplies Network. "We focus on hiring self-motivated employees who are strong problem solvers. If they're not quite where we want them to be technically, we absolutely will invest in training to get the right person prepared for the job," Kaufman says.

The hiring picture is also complicated by the imperative to transform IT. In the search for candidates, business acumen has become as important as technical skills.

Conklin of Christus Health understands firsthand the pressure to find both business-savvy and technically strong IT pros. "Our hiring challenges are at two extremes," says Conklin, who oversees IT at the Dallas-based healthcare provider, which runs more than 60 hospitals and long-term care facilities and 175 clinics and outpatient centers in the U.S. and Mexico.

Healthcare organizations are morphing from traditional disease-driven operating models to a focus on wellness that includes emerging programs such as accountable care organizations. (An ACO is a network of doctors and hospitals that shares responsibility for patient care in an effort to improve care while driving down costs.) So Christus Health needs to hire technical people with solid business skills who can keep up with operational objectives in an industry that's changing all the time.

"Systems we buy will have to be adaptable, and the people we have on board need to understand both ends of the business well enough to not paint us into a corner by doing things that either won't work or will require significant rework in the future," Conklin says.

At the same time, the need for traditional technical expertise is unabated. The changing nature of healthcare "requires us to have very talented, extremely technical people on board who understand the complexities of building secure networks and applications families that will be adaptable for the future," he says.

Is IT ready to be innovative?

"IT leaders are definitely up to the challenge, and a lot of them are further along than they think," Mann says of the imperative for innovation. "They need to develop new skills and approaches, but they'll do it."

Budget remains a hurdle. IT teams need to figure out how to be innovative when they don't have the time or money to do much more than keep the lights on, Mann says.

Business knowledge is essential, Alvarez & Marsal's Christ says. Top-performing CIOs take the time to meet key customers and suppliers, they know their competitors, and they know the agendas of their peers in the C-suite because they talk continuously, he says. "They're conversant in the language of the industry, not just in technical terms," Christ says. "They expect the same of the IT leaders reporting to them and evaluate them on business understanding."

IT needs buy-in from the CEO, Juniper's Iyer says. The CEO needs to reinforce that IT is a critical function, and insist that IT play a role in driving business growth.

Confidence is another necessity.

Iyer, a CIO at a technology company, is often challenged to defend his department's work, particularly since his end users are extremely tech-savvy.

"I tell my folks the example of someone who runs a music store. If you go to the shop, the music guy knows the acoustic guitar, the electric guitar, the piano. He can play all those instruments — but that doesn't make him Eric Clapton. I tell them I'm Eric Clapton. I do this gig for a living. I can go play with any guitar you give me, I can go do this at any company. I may not know the difference in detail between every acoustic guitar or electric guitar, but I can still play 'Layla' and you can't."

Not every CIO has to contend with end users who are engineers, but many face the same skepticism that IT can drive business growth. "You have to [assert yourself] without arrogance, but with some confidence and some sense of humor," Iyer says.

For years IT has wallowed in the shadow of Nicholas Carr's divisive 2003 *Harvard Business Review* article, "IT Doesn't Matter," which, in asserting that IT investments fail to provide companies with a strategic advantage, seemed to diminish the talents of IT.

Today, there's an opportunity for IT to reclaim its role as a trusted adviser on technology and play an active role in driving innovation, Mann says. Just about every business today depends greatly on technology, and if a company isn't getting the most out of technology, it won't succeed.

Technologies such as cloud, mobile and social can highlight IT's potential for innovation, Mann says. "This makes IT not just relevant again, but important." ■

MAKING CHANGES "STARTS WITH CONVINCING YOUR PEERS THAT YOU CAN HELP DRIVE INNOVATION, THAT YOU'RE MORE THAN JUST A SERVICE DEPARTMENT, **MORE THAN JUST A BUTLER TO THE BUSINESS GROUPS."**

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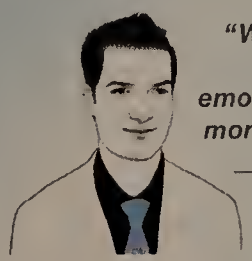

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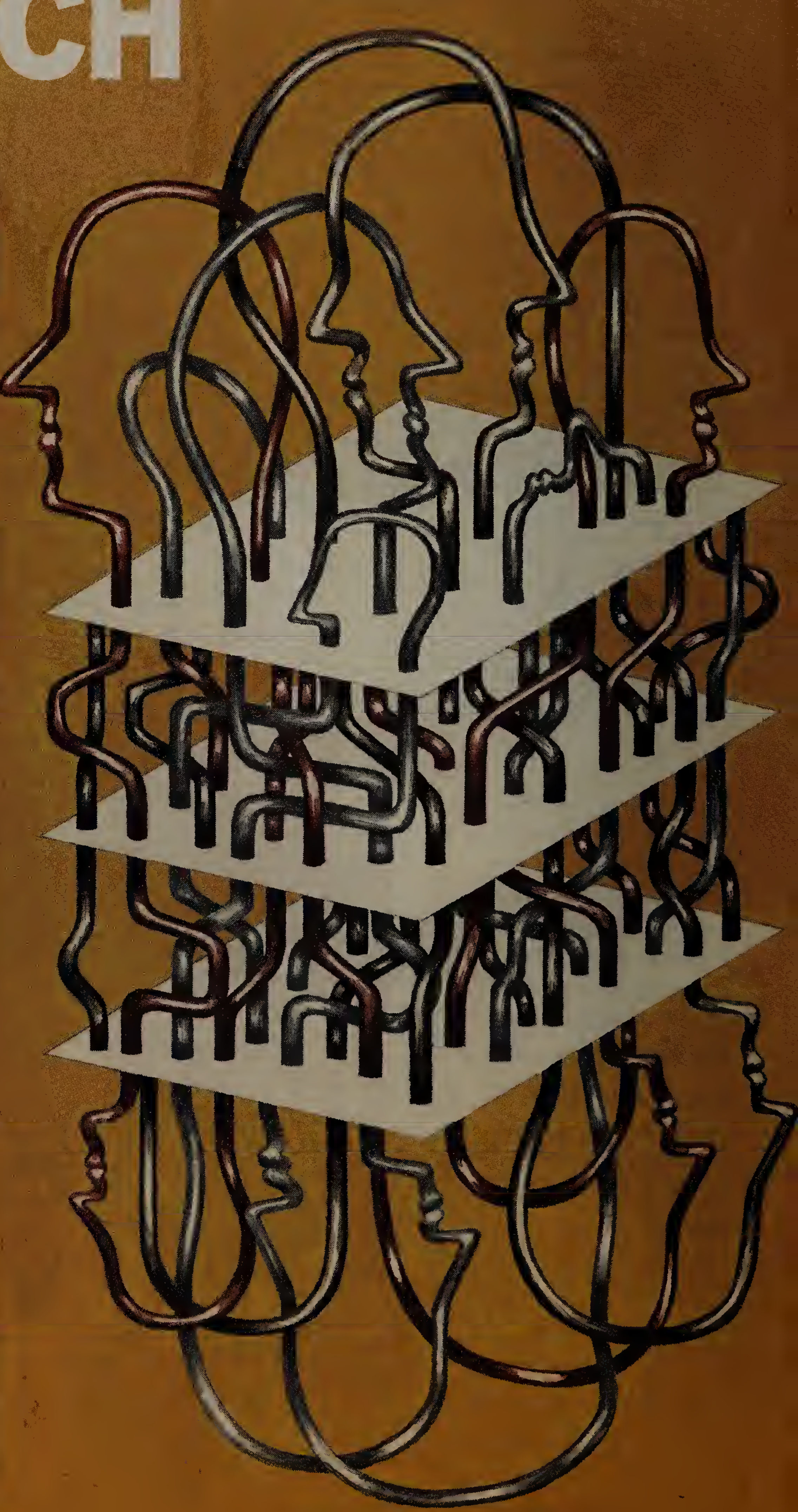
TECHNOLOGIES TO WATCH

2013

ILLUSTRATIONS BY
RICHARD DOWNS



Transmute. Transform. Vary. Mutate. Amend. Modify. Alter. Repeat. Change makes possible what was impossible a very short time ago, but harnessing the new for business advantage is always a challenge. We look at five technologies that promise to make waves here in 2013.

WATCHED BY *JIM DUFFY*

SDN MATURES, PRODUCTS FLOW IN 2013

Advances in OpenFlow, APIs, applications and implementations expected this year

THERE WAS a lot of news and hype swirling around software-defined networking in 2012, so what's on tap for 2013?

Plenty.

Significant advances are in store for SDNs this year, leading to even more in 2014. Some of the milestones expected in 2013 include:

- Advances in the OpenFlow standard.
- Introduction of more SDN- and programmability-enabled products.
- Progress in production and proof-of-concept implementations.
- More applications written to SDN APIs and methodologies.
- Coalescence around specific northbound and southbound APIs for application- and controller-to-switch interaction.

"We'll have QoS and security issues resolved" in OpenFlow 1.3, says Eric Johnson, CEO of Adara Networks, a Silicon Valley-based company that develops SDN software. "You'll see cloud controller software start to centralize around one version of OpenFlow. And then you'll also see northbound APIs and southbound APIs with greater use of Interface to Routing System [specifications] as well as OpenFlow."

Johnson believes RESTful APIs will be the standard on the northbound side while OpenFlow will be among several APIs used on the southbound side. In fact, one southbound API could be SNMP, he says, the network management polling protocol that's been in use for decades.

"There's a lot of legacy network infrastructure for which something else [besides OpenFlow] would be better, because you may not want to replace the control plane," Johnson says. "You may just want to leverage it."

Big Switch agrees with the need to be able to include legacy investments in SDN architectures and supports what it calls a hybrid approach to network virtualization, using both native OpenFlow and an overlay approach to support network resources that do not "sit on a hypervisor," says co-founder Kyle Forster.

Big Switch, one of the founding fathers of the SDN movement, had a big year in 2012, officially unveiling its OpenFlow-based controller and applications, disclosing a large roster of partners (including many industry heavy hitters), and announcing big customers — Fidelity Investments and Goldman Sachs. It also celebrated 10,000 downloads of Floodlight, the open source version of its SDN controller code.

What does it see on tap for 2013?

A doubling of the number of Floodlight downloads, for one, Forster says. Another expectation is that vendors that offer complete SDN solutions — data plane, control plane and applications, all inclusive — will start to separate themselves from the pack, based on customer demand.

"We'll see big Fortune 500s really lead the charge and say, 'Hey, here's the stuff that's mature enough for us to put into our networks,'" Forster says.

And while OpenFlow today has been

focused on Layer 2/3 virtualization, Forster expects 2013 to usher in more players focused on Layer 4-7 applications and services, such as firewalls, application delivery controllers and monitoring in multi-tenant environments.

"Solving the whole problem [for customers] is very, very important," Forster says.

Nobody has more traditional network customers than Cisco. The company ended the suspense around its SDN strategy with the announcement last year of the Cisco ONE programmable network scheme, which includes the onePK API to instill programmability into Cisco routers and switches.

Cisco plans to roll out onePK on its three strategic operating systems — IOS, IOS XR and NX-OS — meaning more Cisco products will become programmable in 2013. "2013 is going to be huge for deployments," says David Ward, chief architect and CTO of Cisco's Service Provider division. "We have a lot in the pipeline that's going to come out" across our enterprise, data center, cloud, mobility and WAN service provider product lines.

"2013 will be the announcements and pre-announcements," says Martin Casado, CTO and co-founder of Nicira, which was acquired by VMware last year for $1.2 billion and has been working with customers for two years to implement data center network virtualization.. "But in 2014, you'll really see the rubber hit the road. You'll see a more mature adoption curve."

So what might disrupt this momentum?

"I think we'll see a Balkanization where the traditional SDN interface will be more suited for research and educational type uses, and where applications like network virtualization are customer- and product-focused," Casado says. "I don't think there'll be anything to change the momentum from a high level — people want more flexible networks. But it's not going to be some big unified front like we're seeing now," he says. That's because vendors will start to customize their offerings in an attempt to distinguish their products.

Adara's Johnson believes any disruption to SDN's momentum will be market-driven.

"If anything derails SDN, it will be that it gets subsumed," he says. "Large vendors ... may subsume all of the technological innovations to the point where the innovations really didn't come from [the developers]. When you incorporate it into a larger mix of platforms and provide a set of customizable capabilities, that may be enough to stop the innovation." ■

> **"2013 IS GOING TO BE HUGE FOR DEPLOYMENTS."**
>
> **DAVID WARD,**
> CHIEF ARCHITECT, AND CTO, CISCO'S SERVICE PROVIDER DIVISION

WATCHED BY *JOHN COX*

GIGABIT WI-FI
ON THE HORIZON

THE NEXT major advance in Wi-Fi, the still-in-draft IEEE 802.11ac standard, seems like a slam-dunk: It promises data rates ranging from 433Mbps to, in some configurations, 1.3Gbps, hence the label "Gigabit Wi-Fi." What's not to like?

But as is usual in wireless networking, the actual picture is more complicated.

There are already consumer-focused access points, routers and adapters based on the existing 11ac draft, which is not expected to change much by the final IEEE ratification in late 2013 or early 2014. And some analysts are forecasting very rapid 802.11ac adoption in client devices. ABI Research recently forecast that in 2015, 70% of smartphones shipping will have 802.11ac radios.

To achieve its high data rates, 802.11ac uses several techniques. One is bigger channels, up to 80MHz wide compared to the maximum 40MHz for 802.11n, and a new modulation scheme to pack more information into the radio signal. Beamforming is a mandated feature instead of an

option as in 802.11n: It optimizes the signal between the access point and each connected client.

But the actual performance will depend on a range of variables: how many data streams the radio supports (a maximum of eight for 11ac), range from the access point or hotspot, the number of other clients associated, the kind of applications being used, and so on.

Apart from the magnitude of the data rate improvements — three or four times that of today's widely deployed 802.11n networks — 802.11ac provides a host of other benefits. Users can expect higher-quality radio links, and see higher data rates (compared to 802.11n) maintained consistently as the distance from the access point increases. There will be much less traffic and interference in the 5GHz band, which is the only frequency band 802.11ac uses, compared to the 2.4GHz band used by a majority of Wi-Fi clients today. And beamforming and the improved signal quality will compensate somewhat for the lower range of 5GHz vs. 2.4GHz.

Finally, 802.11ac is much more power efficient than 802.11n, reducing battery demand in mobile devices. And the much faster data rates mean that users can send and receive a given amount of data much faster, reducing time "on the air," further reducing power usage.

In early 2013 the Wi-Fi Alliance will launch its 802.11ac testing, designed to certify 802.11ac interoperability of different 802.11ac products and brands. The "Wi-Fi Certified" brand will help to make 802.11ac a mainstream technology in short order.

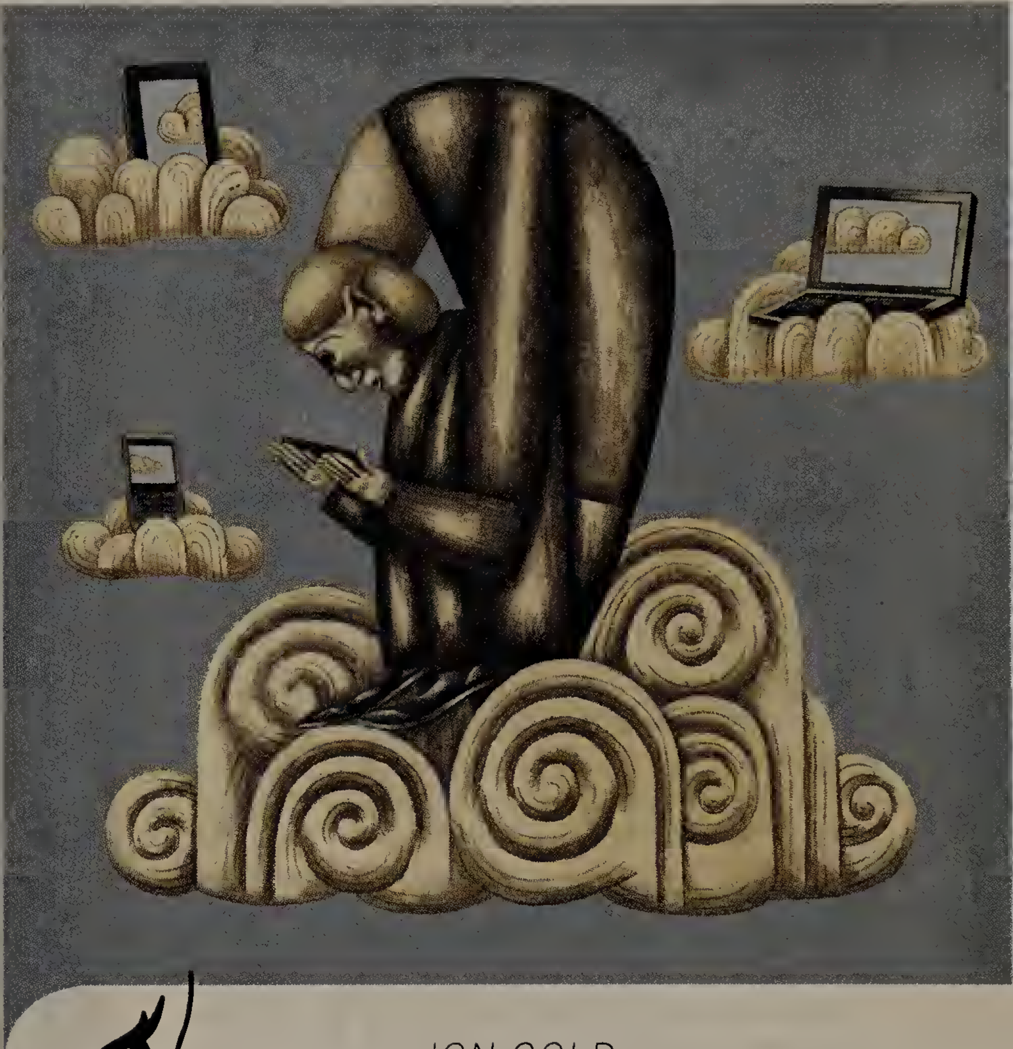
Enterprise access points will begin appearing by midyear. One example is Cisco's previously announced 802.11ac plug-in module for its Aironet 3600 high-end access point. Cisco, and its rivals, have been upgrading their access points and controllers, adding memory, CPU power and other changes to handle the higher data rates as well as anticipated demand for services such as encryption and authentication.

Vendors say they expect enterprises to phase in Gigabit Wi-Fi by adding 802.11ac radios first to high-density areas — with lots of clients or demanding applications or both. At some point, enterprises may have to upgrade WLAN controllers, wireline Ethernet backhaul or switches (or some combination), and RADIUS and other back-end network services.

While still early days, *PCWorld*'s Michael Brown evaluated five available 802.11ac routers on the market in a September 2012 report. "We're talking real-world throughput of 400 to 500 megabits per second (mbps) at close range; that's twice

▶ *See* **Gigabit Wi-Fi**, *page 24*

BUT BY MID-2013, YOU CAN WAVE GOODBYE TO AWKWARDNESS AND JUST REVEL IN SPEED.



WATCHED BY *JON GOLD*

THE CLOUD WILL MAKE BYOD A NON-ISSUE — EVENTUALLY

MDM solutions could be short-term, but you need to focus on usability from the start, experts say

COOLNESS, ACCORDING to technology experts, is at the heart of one of the biggest problems facing business IT today — the rapid influx of consumer mobile devices into the enterprise.

To hear Accenture Mobile executive Joel Osman tell it, consumerization has been the most visible sign of a seismic change in how the business world views technology.

"I like to categorize [consumerization] as 'somehow, tech became cool,'" Osman says. "If you can imagine, not that many years ago, it was almost a badge of honor in the business world — 'I'm not very technical' — and business users really avoided technology as something to be shunned."

That was fine with IT departments, he says, because it more or less gave them free rein — after all, technology wasn't cool, so nobody else wanted to get involved.

"Somehow, we flipped that. Tech has become cool. And consumerization is a big part of that, in that you've got business executives with their tablets, with their smartphones, now espousing how technically savvy they are," Osman says.

The result in the ranks of IT? Panic and devastation, combined with a rapid search for a product — any product — to help address the runaway use of consumer, mobile devices in the enterprise.

"All the clients I talk to seem to think everyone else [has it under control], and that somehow they're behind," Osman says. "In actuality, no one is really in control."

Siemens Mobility Vice President Randy Roberts concurs.

"IT folks are scared to death because they're realizing now that BYOD is happening on their networks, there are devices hitting their networks they're not aware of. And they don't know what kind of devices they are, they don't know who these people are, what applications they have or what content they're getting access to," he says.

Cloud's impact

A big part of the response to consumerization in 2013 will be shaped by cloud technology and user frustration, according to Ted Schadler, Forrester Research senior vice president and distinguished analyst.

"The big thing that's going to be a problem that we'll start to see in 2013, and it's related to [mobile device management] and control, is usability. So when you put in a [mobile device management] solution that forces your employees to use a clunky, slow mailbox, or log in every time, or have a poor user experience, they'll just ignore it," he says.

Moreover, Schadler adds, the entire concept of MDM is essentially a temporary one, as cloud technology erodes the divisions between mobile and non-mobile devices.

"There's going to be a big requirement to rethink the architecture," he says. "This is why the MDM thing is a stopgap, really. ... Nobody worries about security at Salesforce.com. So if I can rely on that service provider to protect my data, then I don't need to put a 'kludge' [stopgap] in place." And since that service is available across many platforms, it's easily accessible from whatever hardware is available.

Another thing that will likely drive mobile services toward the cloud is the frustration of trying to provision them in the traditional way.

"You've got to tunnel through the firewall, you've got to federate, you've got to give permission on a case-by-case basis; it's horrible," Schadler says.

"You don't have to have an on-prem box behind the firewall to do this anymore. All this stuff now can be managed in the cloud if you want to do that," agrees Roberts.

Make a plan

So what's to be done? To start with, Roberts says, companies need to have a clear plan in place before they start making difficult decisions about MDM systems or BYOD policies.

"You really need to define what you're trying to get done," he says.

A recent blog post from Red Hat's cloud computing

► *See* **Cloud BYOD**, *page 24*

WATCHED BY *BRANDON BUTLER*

OPENSTACK CLOUD BACKERS HOPE 2013 IS THE YEAR OF USER ADOPTION

The open source platform has been building a strong vendor community and technical code base; now it's time for the customers

OpenStack has expanded from 30,000 lines of code to more than 600,000.

THERE ARE a handful of major vendors in the cloud computing market. Most agree Amazon Web Services is a market leader on the infrastructure-as-a-service (IaaS) side, but Microsoft, Google and younger companies like Joyent are looking to dethrone AWS. And then there's OpenStack, which is for almost everyone else.

An open source cloud management platform for public or private clouds, OpenStack has spent the last two and a half years building up an impressive roster of backers. HP, Dell, Cisco, IBM, Rackspace and others have all hitched their wagons to OpenStack. Now the question for 2013, experts say, is whether customers will join the party.

The good news: Vendors are taking different approaches to OpenStack, so customers will find lots of options. Rackspace and HP, for example, have built public cloud computing products based on OpenStack code; Dell has committed to this strategy as well. Others, like Linux distribution companies Red Hat, Canonical and SUSE, are each working on their own supported distributions of OpenStack code for end users to build private clouds. These moves are expected to extend the user base of OpenStack beyond the initial use cases already seen in the market.

The promise of OpenStack is to provide an open source cloud platform that both end users and service providers can use to compete with Amazon Web Services. OpenStack backers say having a common cloud platform like OpenStack that powers internal private clouds for users, as well as the public clouds from service providers, will foster an ecosystem where customers will have the freedom to move their applications and workloads between their public and private clouds, and across to multiple vendors.

But the capability is not quite there yet. In fact, Gartner's Lydia Leong cautions users against such lofty expectations. Leong says that interoperability between public and private OpenStack clouds is not inherent.

But, OpenStack is gaining momentum. At the project's last summit in fall 2012, officials said that since the project launched it has expanded from 30,000 lines of code to more than 600,000. More than 600 developers are working on the project, with more than 400 contributing to it within the last year.

2013 will be an important year for OpenStack, says Forrester cloud analyst James Staten. The vendor community has basically been ironed out; everyone knows who's in and who's out. Now, these vendors are going from planning their OpenStack strategies to executing them, and specifically looking for customer adoption. "There are a lot of companies that have committed to OpenStack but they're not making money on it yet," Staten says.

Rackspace seems the most mature in its OpenStack powered cloud. As one of the original founding members of OpenStack, the company has continued to be a leader in the project and now is one of the first to roll out new OpenStack features. HP has made its public cloud generally available, while Red Hat, Dell, IBM and a variety of smaller companies like Nebula — which is founded by OpenStack pioneer Chris Kemp — are all expected to make major OpenStack product news in 2013.

In addition to this ecosystem of vendors and users coalescing around OpenStack, the project's code continues to mature as well. Twice a year OpenStack holds a design summit in which more than 1,000 developers, users, vendors and cloud-watchers gather to discuss the latest trends in OpenStack and plan for the project's next release. The latest Folsom release added a virtual networking component named Quantum, which was developed by software-defined networking company Nicira, now owned by VMware. The project's Grizzly release, the seventh code release since it was founded in 2010, is expected in April, with another release slated for late 2013. Recent reports have hinted that identity and access management, as well as supporting multiple cloud platforms from OpenStack's management portal, could be in the works.

► *See* **OpenStack,** *page 24*

WATCHED BY *TIM GREENE*

WINDOWS SERVER 2012 CANNOT BE IGNORED

This server upgrade is crammed with new features and can enable greater networking possibilities

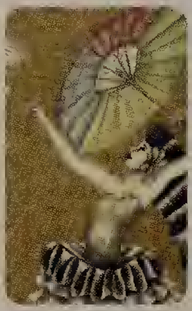
WINDOWS SERVER 2012 packs so many new features large and small that any Microsoft shop looking to gain advantages in cost and functionality will have to seriously consider upgrading this year.

What's more, the product is winning high marks for its flexibility and support of cloud architectures, leading Microsoft to crown it the Cloud OS. When introducing that concept this year, the company's server chief, Satya Nadella, defined Cloud OS as a blend of Windows Server 2012 and Windows Azure cloud service, each optimized to support large data center infrastructures that embrace a combination of traditional corporate-run data centers, private clouds and public clouds.

The result, Nadella says, is a more flexible environment that will make it possible to add and remove capacity as needed and take advantage of the economy of public clouds. The change would be transparent to end users; resources become available as summoned regardless of where they actually reside. And because of the variety of options where resources might be housed, businesses can make decisions about which option is best for which type of data and application.

WINDOWS SERVER 2012

While Microsoft itself is using Windows Server 2012 in its Azure cloud, other cloud service providers are also climbing onboard. Rackspace and Amazon Web Services have fired up services that include as many as 31 different Windows Server 2012 virtual images.



Windows Server 2012 offers service providers and enterprise buyers alike a host of major advances, including:

PowerShell: Microsoft has expanded the number of PowerShell commands tenfold, making it possible to control just about all aspects of the server from command lines rather than the graphical user interface. The latest version also enables scheduling when jobs run, making it possible to batch them ahead of time to run later.

Dynamic Access Control: This sets policies at the server that could, for example, deny access to a confidential file that is being accessed via remote desktop or even from a corporate laptop if it's connecting from a home network. In the past, access would be denied with no explanation, prompting help desk calls. With a Windows 8 client the user is told why access is being denied.

Storage Spaces: This scheme allows amassing all types of storage into a single body that can be subdivided and allocated to separate tasks, resulting in more efficient use of total storage. The collections of storage media are called storage pools, from which virtual disks called storage spaces can be carved out. Storage spaces can allocate more space than the actual capacity of the pool. This is accomplished via thin provisioning, in which blocks of storage are only claimed from available pools when actually being used by virtual machines (VMs). Data is kept from overflowing virtual disks by freeing up capacity whenever files are deleted or an application decides that such capacity is no longer needed. Anything stored in a space is mirrored on a separate physical disk. Pools can be clustered across more than one node, and pools can fail over to another physical node within the cluster.

Hyper-V Replica: This asynchronous replication of VMs in Microsoft's virtual environment enables replicating VMs in branch offices, say, to other branches or disaster recovery sites. Because it is asynchronous, these replications can be scheduled for low-traffic times or times when WAN costs are lowest. The replication also respects available bandwidth, limiting how much it uses in order to maintain performance of other traffic on the same connection.

VDI without a server GPU: Formerly Windows Server required a graphical processing unit as part of the server hardware in order to support USB peripherals on the endpoint. Windows Server 2012 creates virtual GPUs from server CPUs, easing hardware requirements.

More live migration options: Within Hyper-V, virtual machines as well as data can be moved, but also VMs can be moved from server to server both within server clusters and among different clusters.

Best practices analyzer: This tool regularly scans all servers for possible misconfigurations and advises on changes to make in order to keep them in line with best practices.

Improved SMB: The network communication protocol used by the server — Server Message Block — has been streamlined to support faster transfers.

Management: Server Manager within Windows Server 2012 can now handle more than one server at a time.

Using Windows Server 2012 with Windows 8 clients also offers some unique features. "There are areas where benefits and features light up between the two of them," says Jason Leznek, director of product marketing at Microsoft. For instance, when used together they can eliminate the need for public-key infrastructure to make secure DirectAccess connections, which reduces overhead. And when virtual desktop infrastructure (VDI) is used to support tablets, the server enables touch features.

The question is, how compelling are all these new features and capabilities? A large number of enterprises either just completed or are working on transitions from Windows XP to Windows 7 because support for XP ends in the spring of 2014. They may not be ready to tackle a server transition so soon, but the expanded support for virtualization could push many over the top. ■

GIGABIT WI-FI

the speed of the best 802.11n routers," he writes. "And at very long range, where most 5GHz 802.11n routers peter out, an 802.11ac router can deliver throughput of between 50 mbps and 100 mbps — more than enough bandwidth to stream high-definition video."

Right now, without adapters, using these products is awkward: Brown had to use one 802.11ac router connecting wirelessly to a dedicated 802.11ac bridge or a second 802.11ac router configured as a bridge, with devices attached to the bridge by Ethernet cables.

But by mid-2013, you can wave goodbye to awkwardness and just revel in speed. ■

CLOUD BYOD

team says much the same thing, urging an "acceptance" of the inevitability of BYOD.

"In most cases, BYOD is going to require IT departments to do some combination of rolling out new products, educating users and adopting new processes. At the very least, they need to understand potential exposures and come up with a plan for dealing with them. But just saying 'no' isn't a realistic option for the large majority of organizations. And that means acceptance is the only reasonable path forward," the team writes.

Importantly, making those plans will likely have to involve IT working closely with other departments.

"It's not a decision that IT can just circle the wagons and figure out," Accenture's Osman says. "Your buying behavior for personal technology is very different from IT's buying behavior for corporate technology." ■

OPENSTACK

There are concerns, however. Perhaps chief among them is a perception by some that it is simply a marketing project by some of these big-name vendors. But Staten, the analyst, says it is early enough in the project's development that adoption can still take off.

Another threat to success could be more mature offerings on the market. VMware, for example, has its widely used public and private cloud platforms, vSphere and vCloud Director. Microsoft is looking to offer the same with its combination of Windows Server 2012 and its Azure public cloud platform.

And then there's Amazon Web Services. Can OpenStack-backed service providers bite into AWS's market share, and will users trust a still-developing open source project compared to Amazon's massively scalable cloud? Perhaps the answers will become clearer in 2013. ■

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GROWING CONFIDENCE IN CLOUD SECURITY

BY
ELLEN MESSMER
ILLUSTRATIONS
MAYUMI HARYOTO

Companies, schools, government chart course into cloud security

CLOUD COMPUTING is blowing into 2013 on the winds of confidence, with IT professionals increasingly convinced that the security controls are adequate, but still very, very leery.

Take Len Peters, CIO at Yale University, who has undertaken a cost-benefit analysis of cloud-based services in comparison to on-premises software purchases. He finds not only that unit costs are less for the kind of software as a service (SaaS) he's most interested in, but also that SaaS can further the compliance and security goals the IT department has long espoused.

Last spring, Yale elected to migrate from an on-premises IT management application to the cloud-based ServiceNow. The economic analysis indicated a positive cost advantage within 13 months. But security and compliance considerations were and always are going to be critical factors in cloud computing decisions, Peters says. Like many IT pros, he found himself asking the questions, "Is the cloud safe? What are the potential risks?"

The answer, he says, is yes, there are risks, but not necessarily any more than in your own environment if the proper security and contractual arrangements can be put in place with the cloud provider. What's more, use of cloud services can help speed the adoption of best practices that would further safeguard the university.

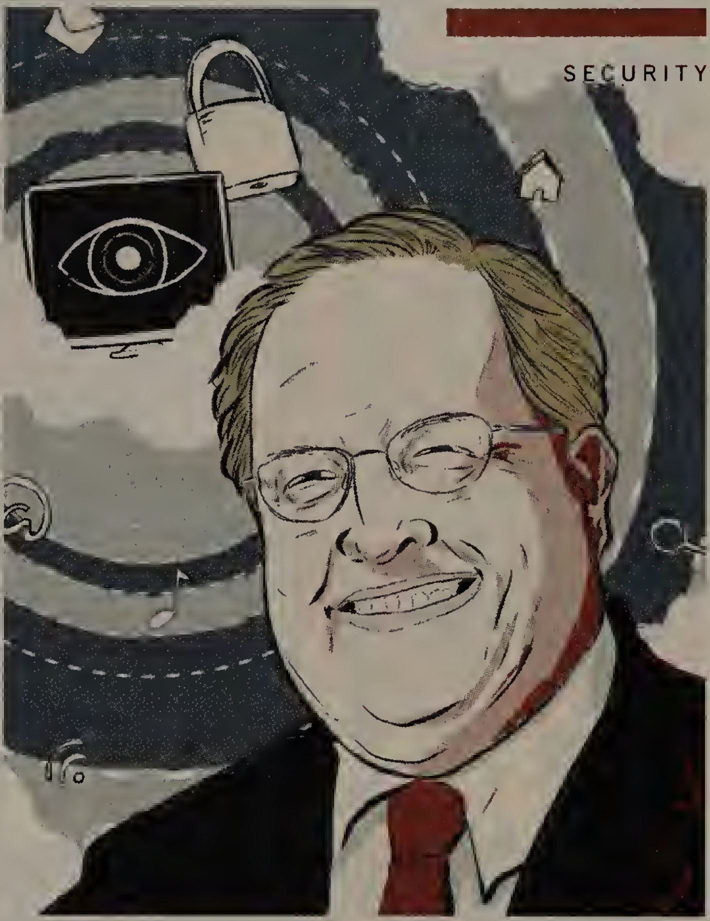
Yale is using ServiceNow to further its support of IT service management practices that are codified in the Information Technology Infrastructure Library. ITIL spells out IT baselines that organizations can use in planning and implementation of IT services, and also can measure themselves against.

"With ServiceNow, we can rapidly stand up ITIL processes," says Peters, noting these involve everything from incident request to change management, which influences the daily workflow for IT support staff and has a bearing on integrity of the university's entire IT environment. The ServiceNow cloud service also impacts Yale's Tivoli Endpoint Management software distribution used to manage the university's computers.

Yale is going to be looking at more cloud computing options in the future for things such as human resources and ERP, Peters says. But not all cloud-based services are the same, either in how flexible they are in terms of contractual demands or in level of security. For instance, Peters remains skeptical about cloud-based email services, because he's concerned about security and availability. But he notes that

"IS THE CLOUD SAFE? WHAT ARE THE POTENTIAL RISKS?"

LEN PETERS, CIO AT YALE UNIVERSITY



THE GOVERNMENT PLANS TO DEPLOY A SO-CALLED **"CONTINUOUS MONITORING"** TO PROTECT CIVILIAN FEDERAL AGENCIES' DATA FROM STEALTHY ATTACKS.

JOHN STREUFERT, DIRECTOR OF NATIONAL CYBER SECURITY DIVISION, U.S. DEPARTMENT OF HOMELAND SECURITY

throughout higher education, the interest in cloud services runs high and everyone wants cloud providers to more quickly tackle risk-management issues.

Of course, not everyone agrees on where the cloud security issues lie. Some organizations, for example, are more than happy to leave email management to the cloud.

Bernie McCormick, director of technology at the Mary McDowell Friends School in Brooklyn, says the school migrated to Google Apps for Education in part so it would no longer have to maintain an email server (which turned out to be an advantage when the superstorm Sandy hit the New York area).

The cloud-based Backupify service also played a critical role in that decision. The Backupify client software, which is used on the faculty's Apple iOS and Google Android personal mobile devices in a bring-your-own-device (BYOD) arrangement, gives the school's IT department the ability to wipe Google Apps folders if a smartphone or tablet is lost or stolen. McCormick, who says the school also uses the Barracuda Networks cloud-replication service for storage backup, foresees use of other cloud-based services in the future.

With security concerns abating, many others seem to be thinking the same thing.

"We have strategically made a shift toward the cloud," says Osh O'Crowley, the CIO at AAA Northern California, Nevada and Utah (AAA NCNU), the regional part of AAA that offers roadside assistance, insurance and travel amenities to its members. The enthusiasm for the cloud is not so much because of cost savings as it is because of the speed of obtaining applications and the benefit of not needing an army of IT staff to support it all, he says.

Within the last 18 months, AAA NCNU adopted ServiceNow as well as Salesforce.com for customer data, and Workday for business-process applications. And it has also adopted Microsoft Office 365 cloud-based office apps Word and Excel for employees. AAA NCNU does retain a number of internal business applications, some mainframe-based.

To unify the authentication and provisioning process for both cloud and on-premises applications, this AAA regional club is now going to move to the OneLogin cloud service. That way the 2,300 employees in its 100 offices can gain authorized single sign-on access to any of these applications, whether cloud or on-premises. O'Crowley says he anticipates this shift to cloud-based single sign-on service being completed by April.

Many other companies, as well as federal and local governments in the U.S. and around the world, are going through similar evaluations of secure, cloud-based computing options. In fact, according to Gartner, growth in cloud computing is the driving force that will shape 2013 security trends.

Gartner predicts that by 2015, 10% of overall IT security enterprise capabilities will be delivered in the cloud. While the focus today is clearly on messaging, Web security and remote vulnerability assessment, Gartner contends there will be more cloud-based security-focused services on the way, such as data-loss prevention, encryption and authentication.

Gartner points out that the U.S. government will make progress in 2013 with its Federal Risk and Authorization Management Program (FedRAMP) that is defining security and compliance guidelines that are expected to drive adoption of cloud services by federal agencies.

The goal of FedRAMP is to get cloud-service providers that serve government agencies accredited for specific security practices over the next two years. These practices would include incident response in the cloud, forensics in a highly dynamic environment, threat detection and analysis in a multi-tenant environment and continuous monitoring for remediation. The idea is that service providers must be prepared to report security incidents of many types to the U.S. Computer Emergency Readiness Team (US-CERT) and the government agency that might be impacted. Cloud service providers that can't meet these requirements in theory won't be allowed to provide services to government agencies.

John Streufert, director of the National Cyber Security Division of the Department of Homeland Security, recently spoke at the Cloud Security Alliance meeting in Orlando, Fla., on how the government plans to deploy a "Continuous Monitoring" capability that would include "Continuous Diagnostics and Mitigation" to protect civilian federal agencies' data from stealthy attacks. The contract solicitation, which is expected to be put out for bid soon, could extend to an estimated 25 million seats and will include cloud-based services as well as on-premises tools. Streufert says it will likely take a few years to complete.

The federal government's initiatives are drawing interest from organizations such as PricewaterhouseCoopers (PwC) that harbor aspirations of becoming a government-certified cloud-services security assessor.

Cara Beston, cloud-assurance partner with the PwC risk-assurance practice, says enterprise customers still have reservations about putting sensitive data in the cloud, but the conversation has clearly changed. For example, CIOs that adopted cloud-based services for what were considered less-sensitive data are now weighing how they might use cloud-services to manage data regulated under the Payment Card Industry Data Security Standard or Health Insurance Portability and Accountability Act healthcare regulation. However, sensitive information concerning things like source code and engineering designs are still generally considered off limits to the cloud today, she notes.

She points out that the cloud has sometimes put internal IT, security and compliance managers on the defensive because line of business managers may have gone around them entirely to select cloud services without asking their advice. This can be tough to fight, but Beston says one way IT can nip it in the bud is to make the IT service acquisition process more collaborative. ■

BEST IT RESOLUTIONS 2013

BY
CAROLYN
DUFFY MARSAN

8 goals for the new year that could **boost your career prospects**

It's that time of year when IT executives' thoughts turn to setting resolutions for the new year. We've talked to CIOs, IT analysts and other industry experts about the major trends for 2013 to come up with our own list of suggested IT resolutions.

1. Embrace BYOD

Here's a trend that you can't beat so you might as well join: employees bringing their own mobile devices to work. Seventy percent of IT organizations are either supporting BYOD now or will be within the next 12 months, according to a recent Gartner survey. "Of the 70% of organizations that want to do BYOD, at least half are not ready," says Dionisio Zumerle, a principal research analyst at Gartner. "You need to change the way you think about security and the way you enable security in the organization. You can't just say to the users 'Please behave' and hope for the best." Zumerle recommends deploying mobile device management (MDM) tools or an alternative called dual-persona software to allow companies to control employee-owned mobile devices and keep corporate data secure. "Having a mobile security policy that is well designed — first on paper — is fundamental and can be enforced through MDM or some other software," Zumerle says. "Enforcing passwords, locking devices and remotely wiping devices gives you a level of security that is close to what you would have on a PC. You need to find a way to secure the devices that you don't own."

2. Strengthen your IT bench

It may seem counter-intuitive to IT executives trying to retain their best developers and project managers, but employees who are trained and certified in emerging technologies usually choose to stay with the organization that paid for their training. "If you train and certify your IT staff, you will keep them," promises Terry Erdle, CompTIA's executive vice president for skills certification. "Training is the No. 1 thing that causes your best-in-class IT professionals to stay, and that is because their company invested in them." Erdle recommends that CIOs provide training and certification to about a third of their IT staff each year so that the entire team's skills are current. Popular certification programs for 2013 include cloud and mobile computing, cybersecurity and project management. "Teams that receive training operate better, are more motivated, have fewer quality issues with customers, and their efficiency goes up," Erdle says. "Project teams that are certified tend to hit milestones on time and reach other success metrics more frequently than teams that are not certified."

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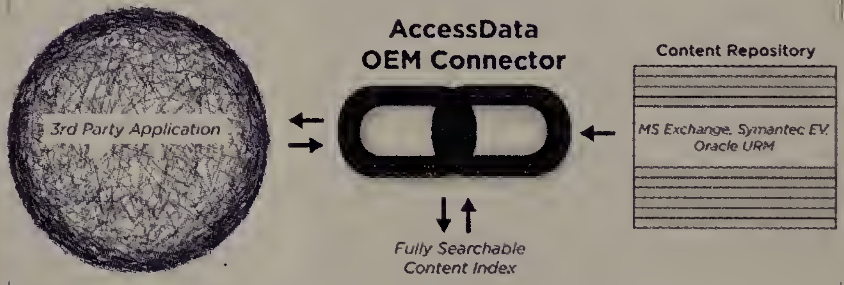
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3. Get your financial house in order

As more IT organizations migrate to a private cloud infrastructure, many are discovering that they don't have the tools necessary to accurately charge internal customers for the IT services they provide. "For 2013, I'm resolving to get better at tracking my costs and tracking my revenue," says Corey Kos, enterprise architect for the state of Alaska. Kos recently deployed Cisco UCS and NetApp FlexPod systems in Alaska's main data centers to enable shared IT services across the state. "If you're going to go to any cloud-based infrastructure and do any usage-sort of capacity, then your chargebacks need to be bulletproof." Kos says he had some difficulty getting the IT and accounting staffs to cooperate on a billing strategy for the email, voice over IP and other centralized IT services that he provides. "We could use some cross-training between the IT and accounting people so they understand what each department does," Kos adds. "It needs to be a two-way, cooperative relationship."

4. Become buddies with the CMO

If you're going to accomplish one thing in 2013, you should befriend your company's chief marketing officer. That's the advice of Frank Gens, chief analyst for IDC. "If you're in a consumer-driven industry, you need to get very close to the CMO because that's where the real innovation and strategic investment is going to happen," Gens says. "With trends such as social technologies, it's not about employees; it's about customers." A key challenge for corporations will be integrating data from the most popular social networks into back-end business systems. IT also needs to cozy up to business executives who are going to drive an increasing amount of IT spending in the future. "Almost 60% of new IT investment in 2013 will involve line of business executives," Gens says. "About 25% of new IT investments are going to be where the line of business executive is the decision-maker, and that 25% will go up to 40% by 2016.

5. Accelerate your move to SaaS

When it comes to enterprise application software — from CRM to collaboration — all the momentum is toward the software-as-a-service model. "The time-to-market with SaaS is very helpful," says Shazia Mian, director of applications systems at Heidrick & Struggles, a Chicago executive recruiting firm that recently deployed popular SaaS offering Salesforce.com and its collaboration tool, Chatter. "There is truly much to be offered out of the box. These applications are pre-built and ready to go, and they meet our business needs. It's much better than starting from scratch and building it out," Mian adds. Heidrick & Struggles is running a pilot project with one of its largest global customers that involves integrating Salesforce and Chatter with its strategic account management process. "Where I see Chatter really helping us is connecting people in a quicker fashion and having all of the account information readily accessible. It should improve the way we manage the account globally," Mian says.

Alwin Brunner, senior vice president and CIO at Heidrick & Struggles, says that "by looking at the customer holistically, we should see that we are filling requests faster and increasing our share of the customer staffing by our global customers."

6. Mine your unstructured data for strategic advantage

Expect the hoopla over Hadoop to continue in 2013. Spending on big data technologies and services will reach nearly $10 billion in 2013 on the way to more than $20 billion in 2016, IDC predicts. Companies will be investing in tools that go beyond search to discover hidden patterns in quantitative data and rich media. That's the challenge facing Quantcast, a San Francisco firm that measures online audiences for targeted advertising. Quantcast processes close to 30 petabytes of data a day, says CEO Konrad Feldman. To handle this massive amount of data, Quantcast built its own distributed file system — dubbed QFS — which it released to open source in 2012. For 2013, Quantcast is focusing on adding new analytical capabilities while continuing to scale up its data processing and hold down operating costs. "Big data is a rich ecosystem for real-time and batch processing," Feldman says. "In 2013, you will see us do more innovation around reducing the latency of batch processing so we can get more answers quickly." Feldman expects Quantcast's big data systems to continue growing in the coming year. "Whatever we do now, we will have more in the future: more data centers, more machines, more data," he says. "We've always been really cost conscious. We've paid attention to how much computing per dollar we achieve. ... Next year, we'll be looking for ways to achieve better efficiency and better cost/performance."

7. Use IT to improve business performance

The top priority for CIOs in 2013 is likely to be the same as it was in 2012: using IT to increase business productivity and reduce overhead costs. That was the No. 1 IT management concern of CIOs in a recent survey sponsored by the Society for Information Management. CIOs aren't so much focused on IT cost-cutting in 2013, but instead on using IT to increase the profitability of the business. That's the main focus for Bob Keefe, who serves as both CIO and CTO of Mueller Water Products, an Atlanta manufacturer of products for water treatment facilities. "In 2013, I'm looking at business productivity and cost reduction," Keefe says. "We're going to focus more on manufacturing cost reduction. We have a lean Six Sigma operation. Now we're going to see how some of our IT systems work to ... get better results." Mueller is already reaping the rewards of similar investments in the past. "We put in a SaaS-based transportation management system that dropped transportation costs for us, and it's lucky it did because our shipments have been more numerous and smaller in quantity lately," Keefe says. In 2013, Mueller also will deploy new ERP software and a CRM service from Salesforce. "We hope to have better sales forecasting," Keefe adds.

8. Measure IT system configuration compliance

Cybersecurity expert Alan Paller suggests for IT professionals who want to improve their organization's network security in 2013: Ensure your systems are configured correctly. Paller, who is the director of research for the SANS Institute, recommends that companies use a tool such as Microsoft's System Center Configuration Manager (SCCM) to determine whether corporate systems are configured correctly, properly patched and using the most recent versions of operating system software. "If you can get people to measure configuration compliance, they will be shocked by what they find," Paller says. "You've got to measure it in order to fix it. ... Measurement is the way to get things done." ■

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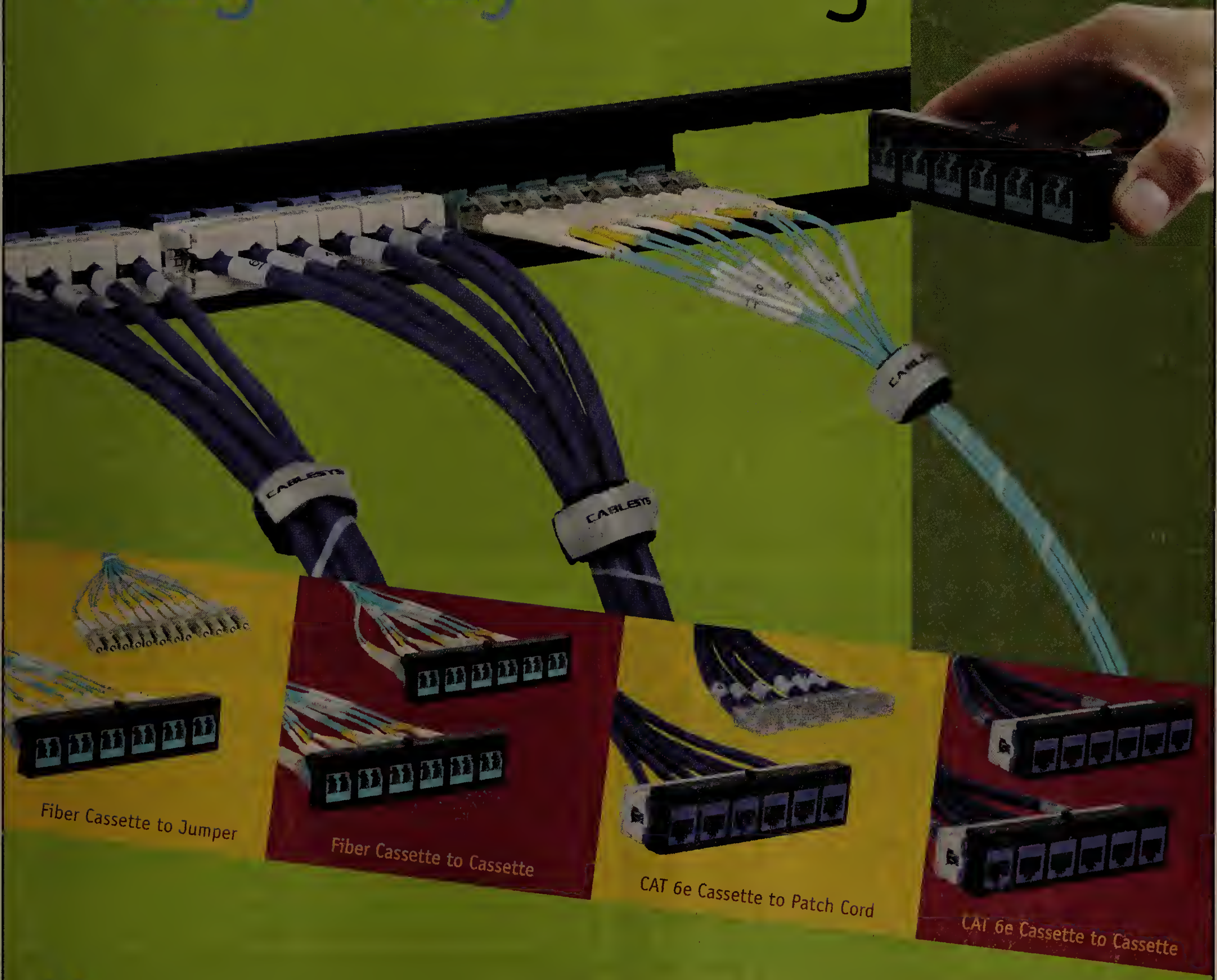
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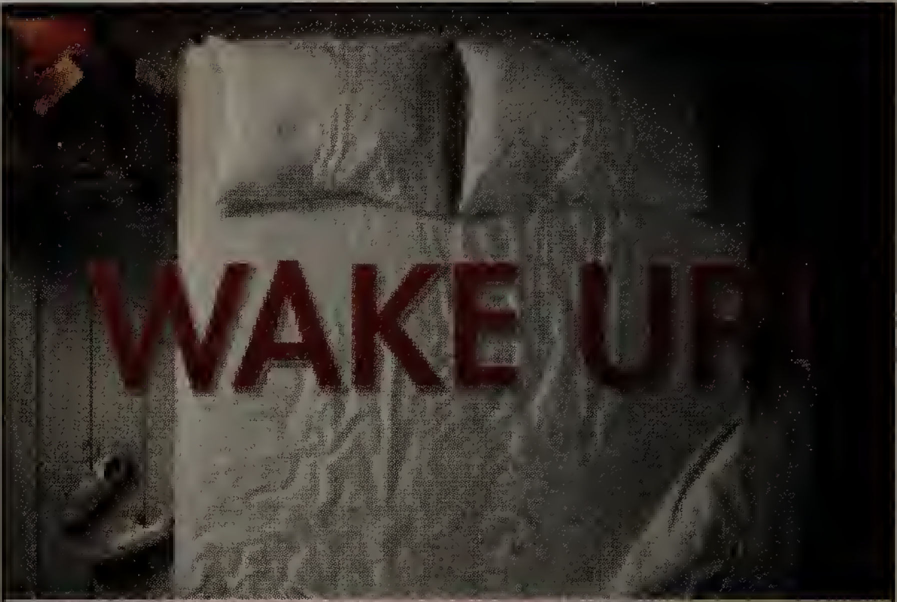

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OUTLOOK 2013... EVEN MORE INTERESTING THAN 2012?

BY
MARK GIBBS

"May you live in interesting times." — often referred to as "the Chinese curse"

Whoooosh! You know what that sound was? That was the sound of 2012 passing into history, and while the view of the past year in your rearview mirror may be in reasonably sharp focus, to clearly see what 2013 will bring you need to me to corral the auguries, marshal the Ghost of IT Future, and scour the industry.

If you want to see how I did with last year's predictions, check out the online version of this column at tinyurl.com/bjo93q7. Just to bottom line it, my predictions for 2012 were 8.5 out of 9. (Yay! Go, me!)

To get a broader read on the future, this year I've asked anyone and everyone with any even vaguely cogent predictions (or just a particularly good snow globe) to chime in. As of this writing I have received more than 400 predictions.

So, what are the contributors predicting? There were several standout topics, with the runner-up being multifaceted concerns about security. Contributors painted a worrying picture for IT in the New Year with an enormous scope of threats and potentially biblical consequences. Problems identified included:

- **More attacks along the lines of the recent Stuxnet infrastructure attacks.** Leonid Shtilman, CEO, Viewfinity, predicts "local critical infrastructure attacks will become real. There have been a lot of stories about the potential for attacks on critical physical infrastructure, and now unfortunately the stage has been set for a real attack. Someone will shut down an area of a country, the electric or power grid for example. The fact that it's not happening today is simply because there aren't that many computer-literate terrorists. However just the way they've trained to become pilots, they're learning computer technology."

- **A shortage of "white-hat" hackers.** Manny Rivelo, executive vice president of security and strategic solutions, F5 Networks, says "the global shortage of white-hat IT security professionals will become acute. While this education and employment situation will likely correct itself over time, there is no evidence it will get better in the short term. Expect to see more automation and expect security functions to become easier to manage (so that non-security personnel can make the right changes)."

- **The death of malware detection.** Tal Klein, senior director of products at Bromium, says "detection as a mechanism for protection will shift from commodity to extinction. Detection (whether based on signatures or heuristics), the traditional methods of evaluating which vendor's information security technology is better than another's, has expired. No more signature arms races, where various tests are run that measure how good each program is at detecting malware. IT will realize next generation information and infrastructure attacks have become, for all intents and purposes, undetectable, and advanced persistent threats are targeting multiple vulnerabilities and engaging whitelisted vectors that prey on organizational structures and social relationships."

Even though security was a big topic, the greatest number of predictions concerned the use of cloud technology and big data (and there was, of course, a huge intersection of these topics with security).

Several contributors predicted a significant increase in the use of private and hybrid clouds.

Colin Jack, lead systems engineer at Embotics, thinks that enterprises in 2013 "will opt for variety when it comes to cloud deployments, looking for the cost-efficiency and flexibility. When businesses are using hybrid cloud environments, IT must clearly weigh the benefits of the workloads against associated risks and cloud management costs."

The predictions about big data also heavily focused on usefulness and scope. One prognosticator says privately that "every phone and conference call, text chat exchange, or video and Web collaboration session is a potential data stream to be captured and harvested for business value. Recording, transcribing, indexing and tagging communications will drive a new productivity boost from big data. Once organized, filtered and made searchable, contextual communications will start to become easier — much to the approval of users suffering from communications and information overload. Users will rely on the system to track what is relevant and current, and draw out previously hidden content and people associations to improve team performance and get more done."

That's a particularly interesting prediction because it parallels a trend we've seen in law enforcement and homeland security, a strategy of total surveillance — gathering as much data on everything and looking for patterns.

While this goal of total communications capture may indeed enhance productivity, the obvious corporate concern is that e-discovery in litigation or crime investigation could expose considerably more ostensibly confidential data than ever before. You can expect the federal government to approve of such corporate initiatives and to quietly promote them.

Beyond the security, big data and cloud categories, the scope of the rest of the predictions was amazing. Mobile apps (and mobile in general) came up a lot, as did social networking, desktop applications, data center, open source, digital entertainment, storage technologies, virtual infrastructure, analytics, business intelligence and virtualization.

In fact, the range of topics and variety of predictions was so great I'm still digesting them all and I'll be making them available online for you to peruse, comment on, and see if you agree with each proposer's estimate of how likely each prediction is.

One thing is certain, if you thought 2012 was an interesting year, 2013 promises to be even more exciting, amazing and challenging than 2012. We do, indeed, live in interesting times. Happy New Year. I hope ...

Gibbs has his fingers crossed in Ventura, Calif. Your forecasts to backspin@gibbs.com. and follow him on Twitter and App.net (@quistuipater) and on Facebook (quistuipater).

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